4-14-1995

Quality Lighting's Landscape Lighting Plan to Guide the Sales Force Into Successful Sales

Christy Mazzola
Lynn University

QUALITY LIGHTING'S LANDSCAPE LIGHTING PLAN

TO GUIDE THE SALES FORCE INTO SUCCESSFUL SALES

By: Christy Mazzola

Dr. Butler
April 14, 1995

OUTLINE

I. **The Project**

A. Assessing Project Needs

1. Interviewing clients and design team
2. Reviewing architectural and landscape plans
3. Visiting the site

B. Documenting and Installing Landscape Lighting

1. Visual design phase
2. Design development phase
3. Construction or contract documents
4. Bidding phase
5. Construction phase
6. Aiming and adjusting lighting system
7. Follow-up

II. **Materials and Technology**

A. Light Sources

1. Physical characteristics
2. Lamp types
3. Functional and operational characteristics

B. Light Fixtures

1. Selection criteria
2. Fixture types
3. Accessories
4. Safety

C. Corrosion, Materials and Finishes

1. Corrosion

2. Materials

3. Finishes

D. Controls

1. Issues

2. Designing control systems

3. Types of control systems

E. Wiring

1. Power distribution

2. Elements of a wiring system

3. Approaches

4. Planning for the future

III. Lighting Areas

A. Residential

1. Working with the owner

2. Design considerations

B. Public Contracts

1. Design issues

2. Budget

3. Equipment selection

4. Project management

IV. Areas of Design

A. Knowledge of Plants

1. Techniques for lighting plants

2. Evaluating plant materials

3. Composition

B. Sculptures, Architectural Structures and Signage

1. Sculptures
2. Architectural structures
3. Signage

C. Walkways and Stairs
1. Walkways
2. City streets and sidewalks
3. Steps and staircases

D. Building or Facade Lighting
1. Luminous composition
2. Fixture composition
3. Equipment
4. Lighting levels
5. Maintenance

E. Water Features
1. Design consideration
2. Types of water features
3. Safety
4. Equipment for underwater use

F. Conclusion
1. Salesperson Responsibilities

INTRODUCTION

Quality Lighting is located in Delray Beach, Florida. They have been selling chandeliers, lamps, lampshades, sconces and every type of lighting imaginable for over twenty-three years. Their target market is selling to builders, decorators and the every day consumer. Lighting trends seem to change almost monthly, and in order to be successful in the lighting business; you must offer the latest product at the best price along with providing the best service around because this is a very competitive business.

Quality Lighting seems to be very competitive in the lighting business; but as times change, any company has to adapt to the latest changes in order to stay on top of the market and continue to be the leader in lighting care.

Landscape lighting is their next venture because they know that they have a market for that type of lighting. The problem is that they are not knowledgeable in that area of lighting. Many lighting gurus claim that landscape lighting is a separate business within itself. Through researching this subject, there has been a realization that it is not as easy as just purchasing landscape lighting fixtures, displaying them and selling them from the floor models.

If Quality Lighting is to implement landscape lighting into their showroom and be successful selling it, they must treat it like a separate business so they can service their customers.

Every factor pertaining to landscape lighting must be researched because they need to be very knowledgeable about this product. The ability to sell it relies totally on the effectiveness of the seller's presentation and their experience. Because they do not have any experience selling landscape lighting, they must look like they have been working with it for years to make the customer feel comfortable working with them.

This project is an important one for Quality Lighting because it will be a step by step training guide for their sales force to follow. This project will include every pertinent bit of information available on the subject of landscape lighting and all the factors necessary to know in order to be a successful sales person in this area. This is Quality Lighting's landscape lighting plan to guide the sales force into successful sales.

This research is knowledge that will give Quality Lighting an edge on competition. They will also have acquired a very nice niche in the lighting field. The project will entail a step by step procedure from greeting the customer, walking through the blueprints to following up after the sale. This project will be Quality Lighting's guideline for every salesperson to follow to ensure the best Quality Lighting and service available.

A majority of this research has come from recent articles written in design magazines. Posing as a customer at various lighting stores locally and on the west coast proved to be beneficial to this project. There is no doubt that Quality

Lighting will be successful in landscape lighting sales because there is an organized plan (a guideline) that every salesperson is capable of following. This project is only as good as its research. Common sense has also played an important role in setting the guideline for the landscape lighting plan.

I. THE PROJECT

I.1 Assessing Project Needs

Interviewing your client gives you an opportunity to start collecting information about the project and develop good comcunication between you and your client. The lighting designer can learn how the client feels about light and their expectations of what the landscape project will do for them.

Many clients have a limited understanding of what the design process involves or what can be done with light to create an atmosphere. Interviewing the client builds the foundation for successful landscape lighting. It can develop a trust between the client and the designer, which encourages the client to rely on the designer for guidance through the project. (Cornwell. 1989)

While interviewing clients, ask questions to get information regarding their design needs and desires. Discuss the clients personal feeling about light, the anticipated use of the landscape at night, the maintenance of the garden and lighting budget constraints and deadlines.

Consider showing a portfolio. This shows the designer's experience and introduces lighting ideas to a client. The designer can lead the client through past projects to discuss lighting effects and techniques shown in photographs related to this project. It provides a time for client feedback and discussion of likes and dislikes. This is the time for the designer to show strengths that relate to this client's project. The strengths can be creativity, technical knowledge, construction experience of a history of quick project completion. These visits often stimulate the clients thinking about lighting, giving them new

ideas about lighting their property. (Davidson. 1991)

People want landscape lighting for various reasons: a nice view from inside a room, use of the space for one or more activities, identification of the property, safety of people in the landscape and security of people and property.

One of the most critical factors to an owner is budget. Clients unfamiliar with lighting costs may have no idea what to expect. "The most expensive part of landscape lighting is not the actual lighting fixture, but the installation which could range in price from one thousand to seven thousand dollars for a standard size home." (Accenting with Landscape Lights. Gibson) The cost depends on the clients desired effect. Bringing up the budget issue during the initial visit prevents wasted time, avoids introducing the client to ideas or equipment inappropriate for the project and maintains good relations throughout the project.

When the budget is limited but the owner wants thorough lighting, consider planning the project in phases. This stretches the budget over a long time frame. For example, plan a complete lighting design, install conduit throughout the landscape for future power distribution; but only install fixtures directly around the building. "In this case always budget the total installation and plan a schedule for installing the remainder of the design to insure that it happens." (Accenting with Landscape Lights. Gibson.)

Thoroughly understanding a landscape design helps the designer plan lighting that fits the project's needs. Drawings build a picture of the complete landscape in the designer's mind.

Before starting to develop a lighting concept, gather a study of all available drawings on the project.

With new construction, acquire both architectural and interior design drawings of the building on the sight, including building and furniture layout. The physical appearance of the building itself is an important element to consider in the landscape lighting. Locations of windows identify view areas from within the building. Furniture arrangements show how people will view the landscape through the windows.

The drawings to acquire from the landscape architect include: "the **SITE PLAN** which provides an overview of all areas comprising the project. The **DEMOLITION PLAN** which identifies what is being removed from the existing layout of the landscape. The **HARDSCAPE PLAN** introduces the organization of the garden as well as traffic plans, stairs, decks, patios and other structures. It shows the living areas, work areas, view areas and other visual areas. The **IRRIGATION PLAN** shows where new ditches will be dug and water conduit installed as well as other irrigation equipment. The **ELECTRICAL PLAN** done early in the project development, locates the main electrical service for the landscape. This plan may be produced before the lighting designer gets involved in the project. It may be done by an electrical engineer on large projects. The **PLANTING PLAN** adds a new layer of information about the landscape design. It is part of the decoration of the space. Landscape architects vary in the way they present planting plans. Often, they use a symbol for each plant type.

Sometimes a separate list of plant identification is produced and not printed on the drawing. In this case, be sure to acquire this list. **CONSTRUCTION AND STRUCTURAL DETAILS** give added information about the setting, stairs, trees, walls and buildings. These details further clarify the design and provide information regarding potential fixture mounting locations. **ELEVATIONS AND SECTIONS** provide details not evident on any plan. These often provide information as to how and where to mount lighting equipment. **PERSPECTIVES** provide a realistic view of the completed project. This information completes the picture of the landscape, helping the lighting designer fully understand the landscape design." (It Can Happen to You. Gould)

When no drawings exist on completed mature landscapes, the lighting designer has three options: to develop landscape drawings, to draw rough sketches of the landscape or to work without producing lighting drawings. Each of these approaches has drawbacks.

Developing landscape drawings adds to the project's cost and requires hiring a landscape architect. Working with rough sketches requires close coordination between the lighting designer and the electrical contractor. Small projects can be done without producing lighting plans, but also increases the designer's on-site time.

"Visiting the site is imperative because it shows existing elements important to the final design. Study views of the landscape from streets or adjacent properties. This helps determine how the initial view of the garden should appear and how to avoid glare going into neighboring properties." (Night Magic. Cornwell.)

I.2 Documenting and Installing Landscape Lighting

After the designer and client have met to discuss the project and signed a project agreement, the designer begins to formulate the design concept and then document the design. The process of turning these ideas into a completed, installed, lighting system involves several steps. First, the owner needs to understand the design, which requires the designer to produce some kind of documentation to convey the lighting ideas.

After receiving approval of these ideas from the owner, the designer then proceeds to produce working drawings that provide the directions for the electrical contractor to install the designer aims and adjusts the system to provide the desired lighting effects. The last step includes providing the owner with as-built documentation and working out a schedule to maintain the lighting.

The conceptual design phase of a project includes developing the lighting theme or concept. The designer makes initial decisions at this time starting with the number and types of lamps to use. Next, fixtures are selected to hold the lamp.

Presentation drawings are made to show the client the lighting ideas and concepts. This gives the client the opportunity to review the initial ideas and either request changes or additions, or approve the concept as shown. A preliminary budge should be prepared at this time to accompany the design. Most of the

changes the owner will request happen at this stage of the project. In order to avoid misunderstandings later in the project, it is critical that the owner understand the proposed design and approve it before working drawings are produced for construction. Most frequently, this approval consists of the owner's signatures on the blueprint or a letter authorizing the designer to proceed with the next phase of work.

The preliminary budget provides an estimate of the purchase price of the equipment, the cost of installing the equipment and the design fees. "Equipment costs include fixtures and lamps, as well as accessories for the fixtures, such as special color finishes, mounting canopies and stakes. The equipment costs also include wiring equipment, such as junction boxes, conduit, conduit connectors, wire, transformers, fuses, cable ties and the cost of the controls. Installation costs include the contractor's labor to install all the equipment, dig ditches for conduit and participate in the after dark aiming session." (How to Install Flood Lights for Outdoor Lighting. Henkenius.)

The designer needs to make clear to the owner that the budget is an estimate and that the actual cost will be determined by the electrical contractor's bidding on the construction document. "The contracting documents for the lighting project consists of two basic elements, the working drawings and the specifications." (Gibson. 1994) The purpose of this documentation is to provide the contractor with information about what material and equipment to purchase and where and how to install it. A designer should

never assume that a contractor understands something or knows what the designer wants. Everything required for the project needs to be clearly indicated and explained on the drawings or in the specifications.

Working drawings consist of all the drawings necessary to construct the design. The actual drawings should include the following information: "location of each fixture, which fixtures should be controlled together, how the fixtures are wired from the main electrical panel through any remote ballasts or transformers and controls, fixture details, installed details and wiring details." (Low-Voltage Outdoor Lighting. Prestly)

All sets of working drawings should include a symbol list that explains every notation on the drawing. Because standard symbols do not exist for landscape lighting fixtures, designers can use any symbols they want as long as they are indicated on the symbols list and are used consistently through all the drawings of the project. (Henekenius. 1994.)

The specifications should be introduced by a document called an invitation to bid, that outlines the general requirements of a contractor to provide a bid on the project. This document typically includes some or all of the following issues:

A) A statement of the type of work to be done.

B) The owner's right to select or reject any bid.

C) A due date and location for the bids to be submitted.

D) Whether the price is to be a lump sum or time and materials.

E) How the price shall be submitted, including separating the

fixtures and installation costs or providing a unit cost per fixture in case fixtures might be added or deleted at any time during the project.

F) A requirement for the bidders to inspect the site to ensure that they have an understanding of the scope of the project and to determine the method of proceeding with the work.

G) Whether substitutions will be allowed, when they will be accepted, and how they are to be presented.

H) Whom to contact for questions or clarifications.

I) How to obtain additional sets of drawings and the cost of these drawings.

J) A statement of the effect that the bidder fully understands the requirements of the project and that no additional charges will be accepted from the contractor unless either a condition could not be reasonably detected from the drawings and review of the site, or if changes are requested by the owner.

K) A requirement to post a performance bond and to have a certain type and amount of insurance, including liability, property damage and personal injury or workers' compensation policies.

L) A requirement for a payment bond that protects the owner against liens on the property by subcontractors or suppliers that do not get paid by the general contractor even though the owner paid the general contractor for their services or products.

M) The time that the owner has to accept the bid and initiate work.

N) The time or date when the work is expected to begin and end, sometimes accompanied by a financial incentive penalty clause.

O) A place for the bidder to sign and date the form. (Cornwell) (Phil)

On small projects, the designer typically recommends that the owners solicit bids from several electrical contractors. If the owner does not know any qualified contractors, the designer will provide them with a list of contractors.

In the construction phase, part of the control of the project phases from the designer to the contractor. The designer typically observes the construction, checking that everything is installed properly and in the correct location.

Near the end of construction, the electrical contractor notifies the designer of the anticipated completion date so that the schedule can be determined for aiming and adjusting the fixtures.

Aiming and adjusting sessions can often last for many hours. The number and length of sessions should be planned by the designer. When all the participants work an eight hour day before the focusing, restricting the length of the session to approximately four hours makes sense.

During the focusing session, the contractor adjusts each fixture to create the desired effect at the designer's direction. This adjustment can include placing low-voltage stake mounted fixtures, then aiming them in the proper direction and at the proper angle, adding lenses to change the light distribution, adding louvers or shrouds to shield peoples' eyes from the lamp

brightness, and even changing the lamp to properly balance brightness relationships from one area to another. For tree mounted fixtures, the contractor moves the fixture until the correct placement is found and then completes the fixture aiming.

As the adjustments are being made, the designer needs to check the brightness balance, overall composition, and potential glare from all viewpoints in the landscape from all view locations inside buildings; and when necessary, from the street as well as from neighboring properties. On large projects, using two-way radios can help the process move more quickly and save everyone's voices. (Cornwell)

After the project has been completed, the designer needs to provide a few more services: the as-built plan, a meeting to familiarize the client and there maintenance staff with the lighting system, and development of an ongoing maintenance schedule.

The as-built plan documents exactly what lamp was installed in each fixture and how all the fixtures are lamped and aimed. The plan makes relamping easy, as the correct replacement lamp can be brought to the fixture and installed when the burned out lamp is removed. It also records the design intent and provides a guide to revise the aiming as the plant matures.

In addition to the lamping and aiming plan, the as-built documentation should also include a list of the quantities of each lamp used, the name and phone number of a supplier from whom spare lamps can be purchased, and a recommendation of the

quantity of spare lamps that should be on-site at all times.

Lighting designers and owners must understand that landscape lighting systems, just like the landscape, require ongoing maintenance. Each landscape project is different and the proper maintenance tasks and schedule need to be planned and implemented. This includes deciding who will do the work and when. Some of the maintenance can be done by the gardener during normal maintenance, such as pruning the growth of plants surrounding fixtures and cleaning fixture lenses. Other tasks, such as reaiming of fixtures, needs to be done by the lighting designer or owner.

Part of the designer's value to a client is the understanding of the construction process, along with the ability to coordinate that process and to see that the project is completed in a timely fashion with high quality work. (Johnson. 1994)

II. MATERIALS AND TECHNOLOGY

II.1 Light Sources

Selecting a specific light source is the most important decision made in landscape lighting. It is the lamp that creates the visual effect. Lamps can be evaluated by several characteristics, including beamspread, candlepower, physical size and shape, color rendition and efficiency. (Whiteley. 1994)

Often in interior lighting, efficiency (the amount of lumens produced per watt) is a major criterion for lamp selection due to the need to provide high quality task lighting at minimal watts per square foot. In exterior lighting, other issues often have greater importance. "in selecting lamps for landscape lighting, designers are more interested in beamspread, candlepower, the availability of low wattage lamps and color radiation." (Whiteley. 1994)

A lamp consists of three parts: the glass envelope or bulb, a filament, electrodes or an arc tube and a base. Low-voltage incandescent lamps and neon lamps also require a transformer, and florescent and high intensity discharge (HID) sources need a ballast for operation. The shapes and sizes of bulbs vary, as do filament shapes and HID arc tubes. Understanding the characteristics and importance of each part of a lamp helps a designer select lamps that will provide the best effect and last outdoors. (Pargh. 1993)

Most incandescent bulbs are made with soda-lime or soft glass. This kind of glass cannot withstand physical impact or temperature shock (from cold water touching it when it is hot) and does not provide for maximum light output efficiency.

Halogen lamps use a hard glass around the filament which permits a higher filament temperature, resulting in increased lamp efficiency. Lamps rated for outdoor use in open fixtures have borosilicate glass, which is heat resistant and hard. Bulbs can be clear, frosted coated or colored. Clear bulbs produce the greatest amount of light. Fluorescent lamps are also typically made from a soft glass. Most of the HID sources use hard glass for the outer bulb and either quartz or ceramic glass for the arc tube. (Pargh. 1993.)

Incandescent and HID are named using one or more letters followed by a number. The letters typically indicate lamp shape. For incandescents they include S-straight side, F-flame, G-globular, T-tubular, PAR-parabolic aluminized reflector, R-reflector, MR-multimirror reflector, A-arbitrary. For HID, they include primarily BT-bulbous tubular, E-elliptical and R-reflector types. The number indicates the diameter of the lamp in eights of an inch at its widest point. Florescent lamps start with the letter F followed by the wattage, then the shape diameter and color. (Pargh. 1993)

There is no consistency in the way lamp manufacturers designate HID lamps. Many use trade names for the various HID sources. For example, General Electric uses the name "Multi-Vapor" and Sylvania uses the name "Metalarc." Because there are so many lamps available, and in some cases such as HID, sources the designations between manufacturers are not consistent; designers need to keep themselves up to date on all of the latest in-

novations and lamps that are available.)

The most frequently used incandescent lamp used are the MR, PAR, R and miniature lamps which all have a built in reflector offering varying light output distribution. The ability to vary beamspread within one lamp shape and one size provides the designer with the flexibility to use any of the lamp wattages or beamspreads available in that lamp family.

Discharge lamps include all the HID lamps: mercury vapor, metal halide, high and low pressure sodium and low pressure lamps: neon, florescent and cold alloyd.

All discharge are more efficient than incandescent lamps. This makes them very useful for foliage lighting and accent lighting on large scale commercial projects. Drawbacks of discharge lamps include the fact that precise optical control is not possible because the source size is so large, wattage is often to high, wattage cannot be interchanged without changing the ballast in the fixture, color and color consistency can be poor, the cost for the lamp and fixture, and they are not easily dimmable.

High intensity discharge lamps can be divided into four lamp families: mercury vapor, metal halide, high pressure sodium and low pressure sodium. All the lamps in this group are more efficient than incandescent, but mercury vapor typically produces fewer lumens per watt than the others. In addition to high efficiency, these lamps have a compact size considering the amount of light they produce.

Some HID lamps have clear bulbs, while other bulbs have a coating. The color of light produced by lamps with clear bulbs is dependent on the type of gas used inside. For example, mercury vapor lamps use mercury gas, which creates a blue/green color of light.

HID lamps all require an initial warm-up period when turned on and if the power is lost, they require a cooling period. This delay must be considered when choosing light for stairs, walkways and parking lots.

Mercury vapor lamps produce light in the blue/green shades. This bulb as a long life, but is not efficient and looses up to two-thirds of its light output as it ages. This bulb's main strengths are its long life, typically twenty-five thousand hours, and the blue color it produces, which looks like the moonlight. Its weaknesses include its limited color range, large physical size, and limited availability due to the fact that all lamp manufacturers do not continue to make this light.

Metal halide offer the most balanced white light color of all the other HID sources. One of the problems with this lamp is that there tends to be color variations from lamp to lamp and a color shift over a lifetime of the lamp. It is hard for the manufacturer to control the exact amount of halide added. A slight drip in voltage can cause the lamp to extinguish. Another negative aspect of this lamp is that it can take up to twenty minutes to cool and relight. Metal halide lamps are used for uplighting trees, lighting buildings and to provide

light at stadiums. This light is the best light to grow plants.

High pressure sodium produces most of its light in the yellow range and its color appears to be a golden yellow. This light offers long life and the most efficient source other than low pressure sodium.

High pressure sodium lamps are typically used for lighting parking lots and freeways. The color they produce makes plants look dull and lifeless and creates an eerie atmosphere. Low pressure sodium is the most efficient light source available today.

Florescent lamps offer a long life, ranging from ten thousand hours in the compact types to twenty thousand hours in the larger size lamps. The average lamp gives you an even wash of light.

Three kinds of special florescent lamps are used in landscape lighting. The first type is a group of lamps designed for low temperature operation called jacketed lamps. Florescent lamps are heat sensitive. Some all weather lamps have a glass jacket to protect them from air movement and provide heat retention to ensure they reach the proper operating temperature.

Reflector and aperture types of florescent lamps are used in foliage lighting because of the controlled beamspread and concentrated output capabilities. Cold cathode including neon are used for decorative purposes in landscape lighting: for signs, outlining buildings and other unusual uses.

The primary advantage of these light sources include their flexibility in size and shape, the availability of many colors

and the ability to produce may colors. They also use very little energy. These lamps must always be enclosed to protect them from moisture and cold temperatures and to protect people from their high voltages. They are always custom made and cost more than other sources. The transformer is loud and noisy. (Pargh. 1993.)

II.2 Light Fixtures

A light fixture consists of the housing, a socket and a mounting assembly. Some fixtures have other elements, including a lens cap or bezel and transformer or ballast compartment. The main purpose of a fixture is to hold the lamp. It protects the lamp and electrical components from the harsh outdoor environment and ensures that the lamp is aiming in the right direction. (Pargh. 1993)

Four issues: aesthetics, function, mechanical features and cost are the different factors to base your buying decision on. Within each of these categories there are several issues to consider. Knowing all the issues ensures that the designer can make the best selection for a project.

Aesthetics is important not only to decorative fixtures, but to functional units as well. The fixture needs to visually compliment the building's architectural style and landscape. Hundreds of styles of fixtures are available in the market today.

Large sconces may be required at the building's main entrance and a smaller version at the secondary entrance, or a small coordinating style for post-mount walkway fixtures. The size of the fixture needs to be in scale with the location where it will be used. To large or to small a fixture may look out of place and may detract from the appearance of the landscape.

Most outdoor fixtures need to be totally enclosed with a lens that is sealed and gasketed in the housing to protect it from water damage. Most lamps are not waterproof. Fixtures meant to use PAR 36 or PAR 38 incandescent lamps can be open

Because the glass for the lens is protected and can withstand the temperature shock from rain, water and snow.

To create specific visual effects on buildings, plants or sculptures, fixtures need the ability to adjust the aiming of the lamp or the beamspread. Designers need to consider both horizontal and vertical aiming capabilities.

When a fixture can be used for highlighting plants, the ability to change wattage and light distribution is important. As plants grow, they expand in size and often become denser in branching. Increased size usually means wider beam distribution, while increased density requires higher wattage.

In some fixtures the lamp can actually be moved within a reflector to change the distribution without having to change the lamp. In some HID floodlighting fixtures, the chamber can be rotated in the housing to shift the lamp distribution without affecting the appearance of the fixtures. Another important consideration in selecting a fixture is the ability to add accessories such as shrouds, louvers, lenses and color.

"Some controversy exists in the lighting industry regarding the entry of water into fixtures. Some manufacturers approach water entry as unavoidable and provide drainage from the lamp compartment." (Lighting Water Features. Moyer)

Waterproofing is important because it prevents internal corrosion of the fixture housing and damage to parts such as the socket or lamp. Sockets are generally metal and are acceptable to corrosion. When a socket fails, the fixture will not function.

Lamps can also fail due to water exposure. Cold water striking a hot lamp can crack the lamp jacket, causing lamp failure. Water accumulation can corrode the lamp base, preventing an electrical connection. (Moyer, 1992)

There are two categories of fixtures: decorative and functional. Decorative fixtures need to conform to the style of the landscape. Functional lighting is used to create visual effects through the landscape and is typically hidden from view. Some fixtures fall into both categories.

Decorative fixtures include several types: lantern, path lights, wall and hanging fixtures. Characteristics such as size, shape, lamp type and wattage will determine whether the fixture is appropriate.

Functional fixtures should be hidden from view both day and at night. Their shape should be consistent with the architectural style and their finish color should be selected to ensure that they will blend with the surrounds. At night, the lamp brightness needs to be minimized or eliminated from a viewer's standpoint. Functional lighting fixtures take many forms: ground mounted, adjustable, hanging, surface mounted, ground recessed, recessed step lights, underwater accent and underwater niche fixtures.

All fixtures require an accessory of one type or another. Accessories include electrical components necessary to allow a lamp to function properly, mounting devices, material that changes the light's beam pattern or color and materials that

shield lamp brightness. (Baig. 1993)

The primary source of safety information and requirements for outdoor lighting fixtures include electrical codes written to regulate fixture construction and installation, the labels that can be applied to fixtures verifying compliance with the safety standards required in codes, and tests done to determine compliance. (Bayard. 1990)

II.3 Corrosion, Materials and Finishes

Corrosion occurs when lighting equipment is exposed to oxygen, water, salt and acids. To determine what is necessary to prevent corrosion, evaluate the environment in which the equipment will be placed. Consider the characteristics of the fixture's materials. Metals that hold up in one environment may break down quickly in another.

The best form of corrosion protection is using a resistant metal such as brass or copper, but this adds to the cost of the fixture. The most practical form of corrosion protection is to use an effective finish like a clear lacquer finish.

Materials commonly used in the construction of outdoor lighting equipment include ferrous and nonferrous metals and plastics. Ferrous metals are those containing iron, a reactive metal which has a higher corrosion potential than nonferrous metals.

Cast iron metals have a limited use in landscape lighting equipment. While fairly inexpensive, they have low structural strength and low corrosion resistance to high temperatures experienced in fixtures due to lamp heat. Cast iron's primary use is for below grade boxes.

Stainless steels have limited use in landscape lighting equipment because the metal is expensive and difficult to work with. It consists of iron based metals with different amounts of additives which can help combat corrosion. Stainless steels are generally susceptible to pitting, deposit, crevice and stress cracking corrosion.

Nonferrous metals and alloys are less corrosive than ferrous metals, making them more useful in outdoor lighting equipment. Most outdoor lighting equipment is made of aluminum, due to its many benefits including its low cast ease of fabrication, high strength and its ability to form a corrosion resistant film on its surface.

Most aluminum fixtures are finished either by a paint finish or an anodized finish in order to provide a desired color and to increase corrosion resistance. Aluminum light fixtures do not hold up well in coastal areas like Florida or Hawaii. Pitting is a more common type of corrosion with aluminum. When exposed to atmosphere, pitting occurs rapidly in a matter of a few years.

A relatively expensive material, copper is normally chosen for aesthetic appearance. Other copper alloy include bronzes and cupronickle. Copper and its alloys offer good corrosion resistance and a protective finish can prevent or delay this problem. Do not locate fixtures where dogs can get to them!

New untreated copper has a patchy appearance that is not always aesthetically acceptable. The more preferred appearance, an even darkened color or patina, is a form of corrosion that occurs over time due to carbon dioxide exposure.

Brass is often used for underwater fixtures and above grade fixtures in very corrosive environments due to its strength and corrosion resistance. This group of alloy is formed from a combinatin of copper and other metals including zinc and nickel.

Another material used for submersible fixtures is typically

a copper alloy with tin as a major alloying element. Aluminum and silicone bronzes combine good strength and corrosion resistance.

Bronze and brass have similar characteristics, except that brass has better corrosion resistance. While the initial appearance of the two metals may vary, they both darken and will be similar in appearance after a short time. (Hufford. 1990)

II.4 Controls

Controls along with wiring, fixtures and lamps comprise the hardware of a lighting system. The controls represent an important part, as they determine how easy the lighting system will function. Controls consist of a devise wired to one or more fixtures that activate or dim the lamp in the fixtures. Control needs depend on the type of project and how the landscape will be used.

Controls regulate which fixtures will turn on and off together and provide the opportunity to alter the level of light. Controls can regulate one group or a multitude of groups manually or automatically.

The first step to take in planning the control site is to identify how the space will be used each night as well as through the week and year. Also, the lighting system needs to have been designed before decisions can be made on how to control the lighting. The next planning step is to identify each potential entry and exit location. These locations along with the way the spaces will be used, identify where controls should be located. The next step, before actually laying out the control system, is to plan how much flexibility will be required in the system. Once the designer has a clear understanding of how the landscape will be used, entry and the flexibility required for a project, the control system can be laid out on a drawing.

Residential properties rarely have a predictable schedule of events occurring daily or on the same day from week to week. They also have a wide range of activities that will occur in

the landscape. These two conditions require a control system that provides a flexible response to impromptu activity. In residential projects, there often is a need for turning on functional lighting separately from aesthetic lighting.

A large portion of the expense in control systems is the capability to dim lights. Using multiple on off switches introduces the ability to create differing effects based on which fixtures are activated.

Commercial spaces often have a regular schedule of events that are repeated every day or are consistent on each day of the work week. This type of project benefits from a control system that automatically controls each group of lights without needing a person to operate it. (Johnson. 1994)

Security lighting is an important issue for commercial spaces. The security lighting system can be a separate group of fixtures or it can consist of one or more groups of fixtures used in the overall lighting system. The type of business, location of the building, and how the occupants use the building help determine the security lighting needs.

"The devises available for controlling light loads include manual on off switches, manual dimmers, preset dimming controls, photocells, time switches and motion sensors." (Motion Detectors. Johnson) The ease, effectiveness and cost of dimming varies form one light source to another. In landscape lighting, the need to dim is limited and typically is necessary only for incandescent lamps. As any incandescent source is dimmed, the color of the light produced becomes warmer. One of the benefits

of dimming incandescent sources is that lamp life is increased. Preset dimming systems offer the ability to automatically dim multiple groups of fixtures, called zones or channels in a number of different combinations. Three types of preset dimming contols are available: those that are self-contained and fit in a wall box, those that consist of a lighting control unit and one or more dimmer panels, and those that are managed from a computer terminal with nearly infinite capabilities. (Johnson. 1994)

Dimming HID sources has not been successful to date. Two basic technologies exist to dim HID sources. One has a limited dimming range, the other using a high-frequency or electronic ballast.

A photoelectric control is a device that turns one fixture or a group of fixtures both on and off based on the amount of ambient light received by photoelectric cells. Time switches are used to turn fixtures both on and off automatically at pre-determined times of day or night. Many models are available with varying capabilities.

A motion detector activates fixtures automatically when movement occurs within a specific area. This device turns lights on for a specific time period when someone crosses a passive infrared beam within the viewing range of the sensor. This can ensure that family members or guest have light to approach a home or serve as a deterrent for potential intruders.

II.5 Wiring

Wiring represents the critical link from a conceptual lighting design to a working reality. Any designer planning a lighting system needs to know enough about wiring to ensure that their ideas will work.

Typically, lighting is powered by the electricity provided to buildings from the local power company. From the main panel, electricity is directed through branch circuits to all the electrical devices planned for the building, including all the landscape lighting fixtures. In planning the wiring for landscape lighting, the designer determines the layout of wires from the building's electrical panel to the light fixtures.

Electricity has the ability to harm or kill people. To control the use of electricity and reduce the risk of harm to human beings, the National Fire Protection Association produces and continually updates (currently every three years) the National Electrical Code. In most areas of the United States, this document serves as the basis for safety regulations.

The local electrical inspectors have the final interpretation not only of the National Electrical Code but of all regulations. If an inspector feels that an installation is in violation of local codes, construction can be halted. Always check with the appropriate authority when a question arises about the appropriate wiring approach for a project. (Cornwell. 1989)

The wiring system starts with the power provided at the main electricial panel. Then power runs through the wires and connections (sometimes placed in conduit). At the end of the wiring system is the fixture, which consists of the lamp

compartment and ballast or transformer compartment or box when required.

The basic guideline for wiring starts with circuit load. The total load that can be attached to a wire depends on the wire capacity, the system voltage, and the circuit breaker (in amperes) back at the main panel. Additionally, the National Electrical Code requires that no circuit be loaded more than eighty percent. On a one hundred twenty volt circuit, the breaker size will typically be either fifteen or twenty amperes. Taking into account the eighty percent loading restriction, this translates into a total load of either fourteen hundred forty or nineteen hundred eighty watts. Prior to laying out the wiring approach, determine which fixtures will be controlled together and total the wattage of these fixtures. This will identify the total anticipated load for each group. (Jefferson. 1994)

III. LIGHTING AREAS

III.1 Residential Lighting

Landscape lighting for residential spaces has practically unlimited possibilities. Residential properties are typically smaller than public properties and the owners often want a more highly detailed end product that they are willing to maintain. Residential landscapes often have multiple uses ranging from quiet entertaining with immediate family using limited areas of the yard, to parties for large groups that spill out into all parts of the yard, to playing a variety of sports in one or more areas of the property. The available budget for landscape lighting can vary dramatically based on the needs of the project, the importance of the lighting to the owner, and the owner's financial means. Overall, residential design requires a higher level of attention to detail from the designer and greater involvement with the owner. (Aronson. 1994)

The lighting designer needs to understand what parts of the landscape will be seen from inside the residence as well as what will be seen of the interior from the landscape. The overall appearance of the landscape represents an important factor in developing a conceptual design. Lighting can replicate the way the landscape looks during daylight or create a new appearance. The owners may have an impression or mood they want to achieve with the lighting, but not understand how light can retain the daytime appearance or sculpt a new look for the property. The designer needs to discuss the importance of all the elements of the landscape, how lighting each in relation to the other will affect the overall composition, and then guide the owner as to what will work best to fit the owner's goals for the lighting. (Henry. 1993)

III.2 Public Contracts

Landscape lighting for public spaces differs in many respects from residential lighting. In public spaces, landscape lighting needs versatility, but here versatility refers to a simple fixture layout that provides lasting effects with a minimum of attention. The types of spaces in this application category include primarily parks and plazas. Because these landscapes have more human traffic and frequent or consistent activities, they demand that the lighting equipment stand up to abuse as well as to corrosion.

The users of public spaces are often not the owners, but people drawn to the space by the activities the owners present on the property. The owner may be more concerned about the total cost of the project than about the potential lighting effects, making the budge quite restrictive. Additionally, these spaces are usually much larger than residential spaces, requiring less thorough lighting treatment to the property. "This type of project often requires using fewer fixtures with more candlepower per lamp and a wider distribution to create a cohesive appearance." (Making Small Houses Something Special. Joyner.) (Aronson. 1994)

Areas of use need to be clearly identified and the lighting approach needs to respond to issues of security. The lighting must ensure that visitors feel free from a sudden approach of strangers.

One way to announce entrances is to use decorative fixtures that have some sparkle or decorative brightness to attract attention and which serve as visual markers. Other approaches include using a higher wattage lamp, more fixtures, larger scale fixtures, or lit sinage.

All landscape lighting needs to respond to the activities that will take place in the space. In public spaces, this may include forum activities, such as performances, sports, dancing, dining, speeches, festivals, or any number of gatherings. The size of the crowd and required lighting level will vary by activity. The designer needs to identify the use clearly and respond to the visual needs that accompany the tasks in each area. This may mean that the light level and distribution will vary from one area to another in the property. (Smallshow. 1989.)

"Identification of a public project or the creation of an image begins with what a person sees from outside the property. Providing identification and attraction to enter the space through the use of light heightens the potential use of the space." (Working Streetlights. Smallshow.)

IV. AREAS OF DESIGN

IV.1 Knowledge of Plants

Plant material represents one element to consider in landscape lighting composition, architectural structures, water features, and sculptures. "Maximizing the beauty of the landscape and ensuring that the design works during all seasons of the year, as well as throughout the life of the landscape, requires an understanding of the plant material. The importance of knowing the characteristics of all the plants listed on a planting plan cannot be overemphasized, as a lock of this knowledge can cause a lighting scheme to fail." (Bad Lighting Battled in New England. O'Meara)

TEXTURE - Texture consists of a somewhat subjective view of leaf size and form, branching pattern, overall scale, and openness of leaf overlap.

LEAF TYPE - This includes shape, color, size, overlapping pattern, density, translucency, or opacity. Leaves may be thick and leathery or thin and diaphanous. They may have a dull or shiny finish on one or both sides. These considerations will direct the choice of light source and appropriate lighting technique.

BRANCHING PATTERN - The plant may have dense branching or open branching. The branching configuration may be inherently beautiful (worth highlighting) or a mangled mess that should not have attention brought to it.

FOLIAGE COLOR - This translates, in lighting terms, into reflectance characteristics. Foliage color also directs the choice of light source to enhance the color. Find out if the color changes during the year. Some foliage changes color from fresh growth to mature growth, when going dormant in the fall, and/or during the flowering period.

BRANCH/TRUNK CHARACTERISTICS - Some trees have color or pattern formations that provide interest and add to the beauty of the plant when lit. The trunk may be stripped or patterned. The bark may be peeling, flaking, mottled, or deeply furrowed. This feature could be emphasized during the dormant period of deciduous plants.

FLOWERING CHARACTERISTICS - Some flowers have bright bold colors and on some plants, flowers are very small and cannot be seen so the light will attract the attention to these flowers.

GROWTH RATE - Determine how quickly and by how much the plant will vary in size and shape over its life. Some plants grow only inches a year, others will grow by feet.

DORMANCY CHARACTERISTICS - This refers to a resting period that some plants experience in winter. Some plants go dormant in the fall by losing their leaves, others by disappearing entirely for the winter. Some plants in their dormant form look spectacular, others do not.

SHAPE - The basic shape of the plant also provides hints on lighting techniques. Tree shapes can vary significantly from young form to mature form. (O'Meara, 1994)

IV.2 Sculptures, Architectural Structures and Signage

Landscape architects use sculptures, architectural structures and signage in their designs. When sculptures are placed in a public setting such as courtyards and lobbies, they are viewed as the people approach the public area. In private spaces such as residential gardens, sculptures typically serve as a focal point.

Structures offer more variety in their use. They can be functional: a greenhouse, pavilion or gazebo. They can also be meant to entertain the eye, but serving no purpose.

Sinage informs people about a building's use such as identifying a store or restaurant. Signs vary in type and appearance.

In planning the lighting approach for any of these features, consider the meaning of the individual sculpture, structure or sign in the overall setting and its relation to other elements of the visual composition. Some structures are incidental and should receive no attention to themselves. One of the keys to successful landscape lighting is choosing what to light, in what order of brightness and what to leave dark. (Safety Lighting. Phillips.)

Always include all pertinent people in the initial design discussion: the owner, landscape designer or the artist. Any of them can have strong ideas about how the sculpture should appear when lit. (Phillips. 1994)

Lighting can enhance the natural appearance or create a new impression of a sculpture at night. Shadow and the direction of light can effect the sculpture's appearance. "Downlighting maintains the natural appearance of the sculpture more easily than uplighting, its very similar to the way sunlight would

hit an object. Mimicking daylight, downlighting creates shadows on the underside of textural details." (Reclaiming the Nighttime Sky. Soberl)

Lighting a sculpture's face from above will create a shadow that may be very disturbing because it distorts the face, and the viewer will not be able to read the expression of the sculpture. The best way to light a face is to shine light from the front or the side. "Another unique effect is to add uplight behind the sculpture breaking the rule that the sculpture should be brightest. It make the background become part of the sculpture itself." (Soberl. 1993).

The lighting approach for structures depends on the intended use of the structure and its visual importance in the compositon. Structures without function can be approached as sculptures, providing realistic artistic effects. Structures with functions need to adress any required task lighting, safety and security along with artistic effects, Always keep the users in mind. Lighting a retirement community needs a higher, more even light and less brightness contrast from one area to another. Resorts, parks, plazas and other more public spaces can use higher brightness contrast to make a memorable statement or to create excitement.

IV.3 Walkways and Stairs

Walkways and stairs provide a path for movement through a landscape. For the landscape to be usable at night, these paths need to have lighting.

Lighting walkways requires understanding of the various types of traffic routes that occur in the landscape. Some walkways have more importance than others and should receive more attention. While an even light distribution is always preferable, more informal types of walks can tolerate more variation. Sidewalks serve as a main traffic routes and require a higher more evenly distribution of light levels. The fixtures tend to be pole mounted at a height taller than a person, and accented in some kind of decorative appearance. (The On-Off Dilemma Public Lighting. Jefferson)

Lighting for all types of pedestrian routes requires providing good visibility on the path surface, but the lighting on the walk should not draw attention away from more interesting visual aspects of the landscape. "In terms of brightness compositon, the path or walk seldom has the highest brightness. Reserve accent levels for features such as sculptures. Instead of a high light level, strive for even light distribution on the path surface. Uneven distribution can hide obstacles, distort the walk surface or confuse pedestrians causing them to concentrate on the path rather than looking at the beauty around them." (Progress Against Light Pollution, Lovi) People feel comfortable walking along a dimly lit path as long as they are surrounded by or walking towards a higher light level.

City sidewalk lighting represents one part of the lighting needs for a downtown area. Street lighting represents the other part needed to complete a downtown lighting scheme. The combined lighting for both sidewalks and streets can utilize one or more of three groups of fixtures: tall pole fixtures, medium height pole fixtures and bollards. Each fixture type serves a different function and differs based on height. In all cases, the fixtures should be spaced out to produce an even flow of light on the sidewalk.

Steps and staircase lighting must provide enough light to identify the presence of stairs. In planning the overall landscape lighting, consider the purpose of the stairs. If they are meant to be used primarily during the day, either do not light them or light them at a low level to avoid drawing attention to them.

Lighting a portion of the width creates a more intimate effect, while lighting the entire width presents a more public appearance. Wide stairs do not always require even light across the tread. For wide staircases used primarily during the day or that do not lead to a destination point, light introduced along the sides identifies the stairs as a precaution to prevent someone from falling.

"Mounting an adjustable fixture in the tree or on the roof overhang provides light to the stair without making the fixture visible during the day. The best results occur when the fixture is centered flush over the staircase. This will also minimize

shadow. If that location is not possible, move down the staircase not up. A fixture mounted to far up will create shadow on the staircase. When mounting fixtures overhead, control the luminaire aiming angle to avoid creating glare and to shield the lamp." (The ABC'S of PIR Sensor. Dooley) The downlight can highlight plantings surrounding the stairs as well as lighting the stairs. This minimizes fixtures while maximizing the lighting effects.

IV.4 Buildings or Facade Lighting

The buildings on a site represent an element in the landscape that should be integrated into the overall landscape scheme. Lighting can be used to interpret the relationship of masses, plants and building detail. Manipulating the introduction of light onto each of these elements can emphasize or redefine the building's appearance.

The way lighting renders a building can visually illustrate a businesses design philosophy. Flashing colored signs made one statement, while light that emphasizes the building's shape presents a completely different impression.

Lighting that is not well thought out can destroy the appearance of the building. Too few fixtures leave holes in the effect and often neglect detail. Too many fixtures either create too high brightness in one or more areas of the building or make the building too bright to integrate with the rest of the neighborhood.

Three elements of lighting control the success of facade lighting effects: direction, intensity and the color of light. Direction of light effects the appearance of texture, shadow and highlights. It is the tool that can emphasize the three dimensional aspects of a building or add depth to the view of the building. (Soberl. 1993)

A wash of light with a fixture located away from the building and directly in front, provides an even flat effect. Grazing with an uplight fixture located in the front of the facade, but close to the surface, accentuates the underside of the

architectural detail such as window sills, sculptures and architectural framework. Downlighting treats the building similarly in accentuating the texture, but creates the brightest effect at the top side of the details. Additionally, downlighting can provide walkway lighting below. Louvers must be used to control lamp brightness. Locating the fixture to the side of the building creates strong shadows while accentuating texture. (Baig. 1993)

Fixtures should be hidden whenever possible. Most often fixtures that highlight facades are functional not decorative, although they might have a clean appearance both during the day and at night. One approach is to integrate fixtures into the building. When a lighting designer is involved during the conceptual design of a new building, fixtures can sometimes be located so they are recessed into the building. (Baig. 1993)

IV.5 Water Features

Landscape architects frequently use water as an element in their landscape design. It has the ability to introduce excitement of serenity into an environment. Water features can include natural streams or ponds, waterfalls, fountains and pools. As an element in landscape, the designer needs to consider whether the water should be lit or not. "Water features, more than any other landscape architectural elements, require a maintenance commitment from the owners, prior to the installation. When one lamp burns out it leaves a hole in the lighting effect, ruining the beauty of the design." (Lighting Water Features. Moyer)

Waterfalls can vary both in height and in width. In one water feature there may be several manmade waterfalls or there may be one spectacular natural fall. When more than one waterfall occurs, the designer needs to consider if all should be lit or just a few. "The key characteristic to know about a fall is the type of weir used. This term refers to the edge where the water falls over when making a vertical drop. The weir can be smooth or it can be rough. When water falls over a smooth weir, it falls as a sheet with no air bubbles. In this case the location of the fixture must be in front of the water shining at it. This creates a sparkle of light on the water's surface." (Lighting Water Features. Moyer)

The fixtures need to be located far enough in front of their fall so the beamspread covers the height of the fall. When the weir is rough, the water moving over it contains air

bubbles. This means that the water will be agitated and should be lit internally using an uplight to create a glow as light interacts with the air bubbles in the water. The location of the fixture in the body of water below becomes critical, and there is little room for error. (Moyer. 1992)

In fountains, the configuration of the water display must be identified, including the number of jets, the type of water effect dome, or pattern they create the height of each effect and the overall width of the display. Aerated effects should be lit from below, while smooth water effects need to be lit from the front.

When a single jet or group of individual streams are used to create a pattern shining straight up, each stream should have a minimum of two fixtures. This assures that the light effect will be visible from all sides of the stream. When two or more jets produce streams that project water across the body of water, each jet needs at least one fixture at the point where the stream hits the waters surface. When the stream is long, more than one fixture may be required to cover the water effect adequately.

The fixtures for use underwater are different than the lights used for the rest of the landscape lighting. "These lights are typically made of copper, brass, or stainless steel. The fixtures must be entirely sealed to prevent water from entering the lamp housing. The fixtures need to have a low water cut off device so the fixture will not continue to operate when it is entirely submerged. If the fixture is allowed to operate

in this condition it can cause the lens to explode and the lamp to fail permanently." (California Light. Aronson)

The location of the fixture underwater is critical. It needs to be far enough underwater always to be submerged, but for uplighting situations, as close to the surface as possible. The recommended minimum is between two to four inches below the water surface. Additionally, the deeper the fixture in the water, the more the color light shifts toward yellow. (Aronson, 1994)

IV.6 Conclusion

SALESPERSON RESPONSIBILITIES

1. First and foremost is sales, selling and getting the customers that come into your store to buy lighting.

2. Promoting customer goodwill and to excel in customer relations.

3. To learn all product lines and know the functions and technical features of the items you sell. (Ask questions)

4. To constantly push add on sales by suggestively selling bulbs, dimmers, cleaner and protectant and other miscellaneous items.

5. Making sure all displays look 100% and the showroom is kept clean! Participate in making your showroom the most beautiful one around.

6. Ask for the sale again and again.

7. Always follow up on house orders and quotes written. If you call the customer and follow up, you have 100% better chance of getting the order than the other store they may have visited!

8. Always suggest landscape lighting.

9. Get leads from your customers, the newspaper, building sites, other contractors and friends. Follow up and build your customer base. The more business referred to Quality

Lighting through you, the more you will be compensated!

***PLEASE NOTE:** Salespeople are given a salary plus commission. As you learn more, your sales position can increase and more money can be earned. Advancement is based on store productivity. your ability to write all types of lighting orders, and your desire to be an independent lighting consultant.

The salesperson employed by Quality Lighting will be one with the following characteristics:

1. The desire to achieve and the self motivation to make it happen.
2. A professional attitude and manner.
3. To be dressed and behave like a professional.
4. The willingness to work hard and not quit until the desired goals are achieved.
5. The investment of time and effort in order to become a professional, top producing salesperson.

If the above mentioned requirements are in your work ethic, then you can be successful at Quality Lighting.

ANNOTATED BIBLIOGRAPHY

Aronson, Steven, "California Light." Architectural Digest. Nov. 1994

California Light was about a designer who specialized in lighting oceanfront properties. This particular article described how the designer took into account the inside view of landscape lighting. Many designers only pay attention to the outside view of the property. After reading this article, I see how important it is to pretend that you are the customer and actually sit on the living room sofa, watch television and look out into the backyard. When you think you are done laying out landscape lighting, you might find that you have only just begun. Those fine details are very important and do make a difference to the consumer.

Baig, Edward. "Outdoor Solar Lights," Fortune. April 23, 1993.

This article was interesting because it began to talk about international manufacturers of landscape lighting. This shocked me because all the experts I have spoken with that are involved in the landscape lighting business said that the United States is the manufacturer of this type of lighting. The only other manufacturer besides the United States is Switzerland, and they only make the lenses on the light and not the whole unit. After reading this article, I realized that I might have found an area in lighting that his not gone international. Landscape lighting is not very popular in any other area, only in the United States. This article also spoke about different light bulbs used in landscape lighting.

Bayard, David. "Outdoor Yard Light," Flower and Garden Magazine. Nov.- Dec.1990.

This article was about a West German Company that is marketing sun powered landscape lighting under the brand name of Siemens. The article spoke of the advantages of this product which is basically very energy efficient and the disadvantages; and there were many more, including expensive to purchase, not all the lights light up if they do not get direct sun exposure and the ones that do light are not that bright. It was an innovative idea though.

Cornwell, Regina. "Night Magic," Home Mechanix. August 1989.

The following was about guidelines to consider before actually installing a lighting system in your garden. If you want to know what should be lit at night you might want to read this. The article also gives designers tips on how to go about lighting a particular feature.

Davidson, Judith. "Night Music," Architectural Record. May 1991.

Read this interesting article if you want to know more about innovations and technological advancements in outdoor lighting. The article also gives lighting designers helpful hints like how each display should be planned individually and takes into consideration not only the design, but also the home's electrical outlets and capacity.

Dooley, Roger. "The ABC's of PIR Sensor", Home Mechanix. May 1990.

Home security is the subject, and a well lit exterior will discourage most burglars. Most people think that in order to scare intruders, their property has to be lit like a parking lot. Instead of doing that, you can install exterior lighting that automatically turns on when triggered by movement.

Gibson, H.E. "Accenting with Landscape Lights," Flower and Garden Magazine, June-July 1994.

A garden's colors and landscape attraction can be enjoyed in the evening with low-voltage lighting. There are various kinds of lighting designs such as uplighting, downlighting, backlighting, path lighting and highlighting. Equipment and wiring tips are also provided in this article.

Gould, Robert. "It Can Happen to You," Workbench, August 1990.

You may be stuck in a situation after purchasing landscape lighting where you are unhappy. Apparently the lighting designer had no clue of equal light, brightness and darkness and just basically lit the wrong things. Another big problem is installing these fixtures that do not adjust. Keep in mind that the appropriate ballast factor in each fixture can change the individual fluorescent lamp burner output. You want to have this option especially if you want to make your light more energy efficient.

Henkenius, Merle. "How to Install a Flood Light for Outdoor Lighting," Popular Mechanics. April 1994.

Installing home exterior flood lights will increase the safety of your house and extend outdoor activities. A detailed how to installation guide is included.

Henry, Phil. "Taking Back the Night," American School and University. Dec. 1993.

Outdoor lighting can make a home more secure and the newest products offer the best security. Landscape lights are becoming more decorative to make a better impression. This article discusses new styles in lights, new finishes and what type of metal to use in certain locations. For example, you would not use solid brass lights in Florida near the ocean. The brass will pit and tarnish. This article was very informative.

Henry, Phil. "Upgrading Municipal Facility Lighting," American City and Country. June 1990.

This article was interesting because it described how you could change the inefficient lighting system you already have. In this case, it was upgrading a municipal facility. The article discussed post lights which light up the walkways and entry stairs. Taller models are excellent for driveway entrances. Garden lights highlight low foliage or beds of flowers. The large shade dispenses the light to a wide area. Accent lights are great along borders or along a row of foundation plantings. They can also be used to light walkways. How about floodlights which can be aimed downward or directed upward. Finally, they discussed deck lights which can be mounted on wooden posts. They are great for parks and deck railings or stairs.

Hufford, Deborah. "Garden Lighting," Flower and Garden Magazine, July - Aug. 1990.

Lighting makes your garden come alive and it highlights curved branches. Soft light shows off flowers, shrubs and trees. This article recommends that the consumer look at other landscape jobs before deciding on what they want to do in their yard. They might find things they like or do not like. It is just a good way to get more ideas and become more knowledgeable. Then call your landscape lighting designer.

Jefferson, Bob. "The On-Off Dilemma Public Lighting," American City and County. August, 1994.

Never overlight a project. It is always better to light less than more. This article was a summary of several case studies and assignments done by lighting designers where they had to go back into a project and correct their mistakes. The redesigns are analysed.

Johnson, Duane. "Motion Detectors," The Family Handyman, Nov. - Dec. 1994.

This article gave me advise for selecting certain types of lights, how their installed and the way lights are set on different controls for on and off usage. If you want to read about the step by step process of landscape lighting, this is the article for you.

Joyner, Louis. "Making a Small House Something Special." Southern Living. March 1993.

Every yard has something special to light. The artistic impact of a house can be enhanced through proper use of exterior lighting. Uses of lighting includes emphasizing statues, interesting branches and fountains.

Lovi, George. "Progress Against Light Pollution," Sky and Telescope, March 1992.

Advice on how exterior lighting can be made more efficient is provided keeping in mind that this article is about light pollution so in that sense, the views of the author is to minimize light wherever possible. They suggest using motion sensors which in most cases gives terrible landscape lighting.

Moyer, Jan "Lighting Water Features," Architectural Record. Feb. 1992.

Landscape designs often feature water, and proper lighting of the water can greatly enhance the effects. Techniques involved in lighting waterfalls, water jets and pools are discussed. I really enjoyed this article. Electrical lighting must of course, be able to withstand the water's corrosion effects.

O'Meara, James. "Bad Lighting Battled in New England," Sky and Telescope. April 1994.

This article is about the International Dark Sky Association in New England. They are actively campaigning against light pollution. There are a number of statistics listed here such as: due to pool fixtures, the United States wastes some two billion dollars a year on electricity that lights the sky instead of the ground. This article lists the progress against light pollution for the past two years.

Pargh, Andy, "Low-Voltage Lighting Easy to Install," Design. Oct. 18, 1993.

This was a great article. It taught me that low voltage, exterior lighting systems are more economic than solar powered lighting. There are many advantages and disadvantages listed. One solar powered light can cost as much as a low-voltage system and may not provide much light if the weather is cloudy. Low voltage lighting is really the best way to go.

Phillips, Bill. "Safety Lighting," Home Mechanix. March 1994.

Safety lighting can help prevent household accidents and scare thefts. The three main types of safety lighting controllers are motion detectors, photoelectric cells and timers. Tips for selecting and installing safety lighting are presented. This was an article you could read twice because there was a lot of interesting information given.

Prestly, Don. "Low-Voltage Outdoor Lighting, "The Family Handyman. June 1989.

This article was about accenting the positive. Many tips were given to help designers create a beautiful garden of night. Here is just a sampling of what I read. Flood or spot lights can provide that added emphasis to complete the landscape. Substituting a colored lens or a clear one on a floodlight will also add drama to a setting. I have learned that many floodlights have an adjustable or variable beam. This allows you to focus a narrow stream of light to one specific object or open the beam wide to include surrounding plants or landscape. Wow, what an article!

Smallshow, Earl. "Working Streetlights," Model Railroader. March 1989.

City lighting can make citizens feel safe or intruded upon. A well lit city has always been assumed to be a safe city. Here the matter is a delicate one because our cities need proper light and design. It is important with any project you do. There must be an appropriate balance.

Soberl, David. "Reclaiming the Nighttime Sky," Avolubon. May - June 1993.

Good landscape lighting designers are greatly needed. Light pollution, the amount of indirect illumination from street lighting and other sources are making it difficult to appreciate the night sky. Much of this intrusive lighting is wasted because it is designed inefficiently.

Whiteley, Peter. "Going Up for Light," Sunset. June 1994.

Take a look at this article. A seventeen foot tall monitor or light shaft is built into a house to provide natural lighting and create more space. The monitor is a thirteen foot square light shaft with windows on all four sides, rising six feet above the old roof. Walls opened up between the central dining room and adjacent rooms adding space. Outside,their water fountain was the brightest object lit and stood as a focal point in the garden.

A beginning to end site project at Farries Lighting for a landscape lighting sale.